Investment Opportunities, Earnings, and Costs to Manage Southeast Alaska's Fishery Permanent Fund

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Division of Commercial Fisheries
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INVESTMENT OPPORTUNITIES, EARNINGS, AND COSTS TO MANAGE SOUTHEAST ALASKA'S FISHERY PERMANENT FUND

By

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and
Scott McPherson

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PREFACE

This report is a summary of a presentation given by Scott Marshall at the Southeast Conference in Skagway, Alaska on September 21, 1989. The opinions presented in this report are those of the authors and is not necessarily those of the Alaska Department of Fish and Game.

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FISHERIES: A PERMANENT FUND

The fishery resources of Southeast Alaska should be thought of as a permanent fund comprised of diversified investments in many species and stocks. The average annual earnings from this fund is about $200 million. These earnings account for 40% of the private sector personal income in Southeast Alaska. The investment bankers for this portfolio are the State's commercial fishery management biologists. To develop the full earning potential of our fishery permanent fund, Alaskans must reinvest a significantly greater portion of the earnings back into management of their fund.

As managers of the permanent fund, the fishery biologist has two overriding tasks. First, he needs to determine the rate of return which can be expected from investing varying proportions of the resource in future years' income versus extracting the wealth as current income. Second, because of inevitable environmental uncertainty, he must, each year, determine the actual rate of return from the previous year's investment. With this information in hand he must subsequently establish fishery regulations to achieve the desired investment strategy. Poor understanding among Alaskans of these tasks and the data needed to correctly implement prudent investment policies has, and will continue to have, serious economic consequences.

Returns from fish stocks are not the same as typical investments in the banking and securities industry (Figure 1). For most investments, the rate of return is dependent on market conditions, but the same rate is realized no matter the size of the investment. Fish returns, however, are dependent on two factors. First, returns of fish are dependent on the amount invested. If too little is invested into future returns, those returns will be small (see Figure 1), but the annual rate of return will be high (see Figure 2). Conversely, if too much is invested in future income the annual rate of return will be low and can actually become negative! Under this condition, a fishery permanent fund's capital (stock size) may remain fairly high, but there is no wealth extracted. The underlying reason for the shape of this curve is the productivity of the natural environments in which fish live.

From this analogy of the securities industry, the first task of the fishery manager emerges. That task is to determine the rate and magnitude of the return which can be expected from various levels of investment in future-years' income. This is not a simple problem because rates of return vary considerably between stocks; thus, we must determine the investment curve for each stock in order to succeed. You can see how important the variability in the productivity of individual stocks is by inspecting Figures 2 and 3. In the final analysis, balancing investments into fish for the future and fish for immediate harvest can be done rationally only if there is considerable investment into obtaining quantitative knowledge about the productivity of resource. Determining the form of this investment curve requires annual assessment of the number of fish which are caught and which escape to spawn each year. While this may seem straight forward, the variable age of maturity among stocks, harvest of stocks when mixed, and uncertainty regarding total stock size usually makes estimation technically complex.

The second problem faced by fishery managers is to determine the actual size and rate of return in a given year from the previous investments and to subsequently develop regulations to harvest only the production which is surplus to long term investment needs. Realized returns deviate from the average because of environmental conditions which managers can not control (see Figure 4). This problem is somewhat analogous to stock market fluctuations to which a prudent investment banker must also respond in order to preserve capital and maximize earnings.

Management of our fishery permanent fund takes three basic forms (Figure 5). To realize the maximum sustained yield from our fishery resources, we must **intensively manage** the annual capital investments. Without the data and programs to support intensive management of our fishery resources we simply do not know where we are on the investment curve. The safest approach in the face of such uncertainty is to adopt a **conservative approach** . This strategy preserves our capital (stock size), but the earnings (catch) are very low and thus little economic benefit is realized. Last, without good information, a risk exists to the long-term earnings by **overfishing** the stocks. While the rate of return on investments can be high under these conditions, the low capital (stock size) translates into low returns and earnings; in addition, we risk a total loss of capital.

In the end, a basic policy question for Alaskans emerges; are we willing to blindly investment our fishery permanent fund without knowing what our earnings or the rate of return will be? Without prudent investments into intensive management of our fisheries permanent fund, the answer is yes. The consequence of this decision is that fishermen, processors and our community support industries will not fully develop.

INTENSIVE MANAGEMENT

By the early 1950's, the potential benefits of intensively managing high-value terminal salmon fisheries in places like Bristol Bay and Chignik were being recognized by federal managers and the processing industry. This recognition led to development of cooperative research programs in many areas of Alaska. The structure of the fisheries and character of the rivers to which the fish returned permitted development of intensive management programs in such places using simple technology. By the mid 1970's, the benefits of the investments made to intensively manage such fisheries were becoming obvious to many people. Steve Pennoyer was one of those people; he and others reviewed the state's salmon management program and found that we could not apply intensive management to many of our salmon stocks without: (1) developing new technology to count escapements in glacially occluded or muddy rivers; (2) developing ways to identify the origin of fish when caught in mixed stock fisheries; and (3) funding programs to sample catches and escapements to determine the age composition of returning fish. These were the basic data sets needed to **reconstruct the runs** so that we could determine what the investment-

return relationships were. This commitment seemed risky by some and was difficult to fund because Alaska was not flush with oil revenue.

In the early 1980's, Dr. John H. Clark joined Mr. Pennoyer's staff and early research into this new technology led to development of some operational systems. Together, they identified a few places in Alaska where we could start new programs to obtain the run reconstruction data which would be needed to intensively manage for maximum substantiable yield. They selected a few high-value fisheries where it would not cost a great deal of money to obtain these data. Why did they do it? Obviously they believed in the potential economic benefit, but in addition, they also believed Alaskans needed demonstration projects to be convinced of the benefits modern technology could bring to enhancing the State's fisheries and preventing overharvests experienced elsewhere.

As the 1990's begin, we are the heirs to that vision and can now report that those early demonstration projects have shown us how to reap substantial benefits. The two fisheries which were picked as demonstration projects in Southeast Alaska were the sockeye salmon fisheries of the Situk River and Lynn Canal. I would now like to review the results of these two demonstration projects.

The Situk River is one of largest sockeye runs in the Yakutat area. A commercial set gill net fishery operates near the river mouth. Developing run reconstruction data for the Situk River was fairly simple because, since 1976, the department had been counting both the number of fish which were caught each year and how many escaped the fishery to spawn. The only thing we did not know was how old the fish were which returned each year. Without this age data we could not compute our annual return for known levels of investment. We solved this problem in 1982 by sampling the catch and escapement for scales (which are used to age salmon).

Prior to 1985 department managers thought that maximum return on investment would be achieved for the Situk River if 100,000 fish were invested into future production each year. In 1985, after seeing small runs come back in the early 1980's, managers became concerned that this goal was too conservative and intuitively lowered that goal to 80,000. However, by 1988 we had enough run reconstruction data to quantitatively evaluate production potential. Our analysis (see Figures 2 & 3) showed that 50,000 fish (half the original goal!), would provide the largest average annual harvest. This meant that fishermen in the area should harvest 30-50,000 more fish per year than had previously been thought. Following collaberation of this result by limnological investigations, managers lowered the escapement goal for Situk River sockeye salmon to 50,000. With this relative certainty regarding the correct investment strategy, we quickly recognized the need for more timely data on the number of fish escaping the fishery to spawn to regulate the fishery. To meet this need for timely, data on numbers of fish escaping, the department moved the fish counting weir from a far upstream site to the lower river.

What are the costs and benefits of this program? During the next two seasons an additional $825,000 worth of fish were taken. The annual cost to Alaska's general fund to obtain, compile and analyze this

investment data is about $39,000 per year. This represents only about 4% of the current annual ex-vessel value and an annual gain of 84% in long-term ex-vessel value[1]. Without the initial commitment to invest some $39,000 per year ($234,000 over six years) to develop the needed data, we would not have been able to realize the benefits which are $400,000 per year or approximately a 900% return on investment for our present program.

The Lynn Canal run of sockeye salmon is the second demonstration project I would like to discuss; it is the largest sockeye run in Southeast Alaska. Fish from both Chilkoot Lake and Chilkat Lake comprise the run and they are caught mostly in the drift gill net fishery of Lynn Canal. Because both stocks are harvested together in a common fishing area, the department was unable to determine the production which was returning each year each from these two lakes. Mr. Pennoyer and Dr. Clark realized that if we could determine the number of fish in this mixed stock fishery which had come from each lake, and from what year's escapement, that the investment curves could be discovered. These were the only pieces of information needed because weirs were currently in operation at the outlet of each lake to determine the number of fish invested in future years' production. In 1981 they implemented newly developed scale pattern analysis technology and an age composition sampling program to determine what the investment curves were.

By 1989 we accumulated enough **run reconstruction** data to evaluate investment strategies for these stocks and found, just like the Situk River, that the previous escapement goals were too high. Managers lowered the escapement goal for Chilkat Lake by 20,000 fish and that for Chilkoot Lake by 10,000 fish.

What are the implications of this new investment knowledge? Since 1976 we have harvested approximately $25 million worth of Chilkoot Lake fish and $16 million worth of Chilkat Lake fish. If intensive management had been in place in 1976, the region's fishermen could have realized an additional $7 million in income from the Chilkoot Lake stock and $6 million worth from the Chilkat Lake fish. Thus, we only realized 79% of the earnings potential from the Chilkoot Lake stock and only 74% from the Chilkat Lake stock. For the future it means that an additional $900,000 worth of fish can be harvested each year.

Recall that knowledge of the investment curve is not, by itself, sufficient to realize the benefits of intensive management. We must also be able to assess the run strength in-season in order to react to the uncertainty in survival rates caused by the environment. Contrasting our in-season assessment capability for the Chilkat and Chilkoot stocks reveals the importance of this in-season information.

For the Chilkoot Lake stock, keeping track of the daily escapement is easy because the weir is very close to the fishery. Fish take less than one week to arrive at the Chilkoot weir after leaving the fishery. Overall, because of this in-season management capability, we have been able to control harvests to within about 20% of goal. However, because it takes fish of the Chilkat Lake about a month to arrive at the

[1]Ex-vessel value is the gross revenue paid to fishermen.

weir from the fishery, we have been unable to precisely regulate the fishery to achieve our desired escapement goals. The management error for Chilkat fish has been over three times that of the Chilkoot River stock and cost millions in current-year and future-years' income. To correct this problem we would have to develop reliable estimates of the number of fish escaping into the river in time to develop appropriate fishery regulations. Such a program would cost about $90,000 in capital expenses and about $100,000 per year to operate. Is it worth it to fund a program of this nature?

Our knowledge of the Chilkat investment curve tell us that such a program would add a minimum of $260,000 to the value of the Chilkat Lake catch each year. However, this figure appears conservative because of two things: (1) the loss resulting from the 1989 run alone was $1.5 million, and (2) once escapements are stabilized at Chilkat Lake we expect that productivity will increase and be more like that of Chilkoot (see Figure 3). We expect the rate of return for such a program to be 160% to 300%.

OPPORTUNITIES AND OBSTACLES

There are opportunities and obstacles to developing the long-term value of the Southeast fishery permanent fund. Not all of the opportunities are known, neither are all the obstacles. What is clear, however, is that investments are needed to unlock the earnings potential of the fund. It is also clear, by reviewing our experiences in Yakutat and Lynn Canal, that substantial benefits can be realized even from fisheries which we think are fully developed. In this section, I discuss our opportunities and obstacles and begin by addressing one of the most frequently discussed obstacles, that of obtaining quantitative investment data for a salmon resource when literally hundreds of stocks are harvested together in mixed stock fisheries.

Obstacles

In some fisheries, like Lynn Canal, we can inexpensively account for all stocks in the harvest. In others like the troll coho fishery, we can not. Catches in this fishery are composed of fish from literally hundreds of different stocks from different locations. It would be economically unfeasible to construct weirs at each and every coho spawning location and probably technically impossible to develop technology which permitted us to account for catches of each stock in the fisheries. For such fisheries a different type of run reconstruction data base is required; it is called **indicator stock run reconstruction.**

Indicator stock run reconstruction is the same data base described for Situk River and Lynn Canal sockeye earlier except that not every stock is counted. Rather, we count several individual stocks and

use them to represent the whole resource. To apply indicator stock management in Southeast Alaska's coho fisheries, for example, would require that we establish carefully chosen sites where we could count escapements and tag juvenile fish before they went to sea. Such data would permit us to determine what portion of the run was caught and what portion escaped to spawn and hence determine what the investment curve is.

The second obstacle we face is development of new technology that will permit use to intensively manage some fisheries. In the mid 1970's Mr. Pennoyer also faced this obstacle. At that time commitments were made to fund development of new technology within the department's limited budget. Millions of dollars were invested to develop sonar and stock identification technology statewide. Today Alaskans are reaping the benefits of that vision and the payoffs are larger than anticipated. However, we seem to have lost that commitment to develop innovative, cost-effective stock assessment technology which we once had. It will be impossible to develop many of our shellfish, groundfish and herring fisheries without investing more into such practical research programs. Previous experience has clearly show that it would be a poor business decision not to commit the "venture capital" necessary to research and develop needed new technologies.

The third obstacle we face is recruiting trained professional staff to implement technically complex projects. The skills required to conduct contemporary stock assessment research requires specialized graduate level education in such areas as mathematics, hydroacoustics and stock identification. For the last several years we have found it very difficult to compete with employers both inside and outside of Alaska for the limited number of trained people in the workforce. One part of the solution to this problem is to develop a fully integrated research program with the teaching mission of the University of Alaska, Southeast. A second part of the solution is a recommitment to compete for these trained scientists.

Fourth, the structure of some fisheries themselves causes problems in accessing stocks which are healthy while protecting stocks which are weak. Because of historic use patterns, changing the structure of fisheries to maximize earnings can not happen without data which shows costs versus benefits of restructuring; furthermore, such issues can not be addressed without extensive planning and public participation. Realistically, this obstacle can only be overcome by obtaining quality stock assessment data and then developing options for access through expanded open public meetings.

Last, funding is needed to do the research and stock assessment which will permit us to unlock the earnings of our permanent fund. I will discuss this topic at length after outlining a basic investment strategy.

The Basic Investment Strategy

What should we consider when selecting where to invest in intensive management of our fisheries permanent fund? Opportunities should be evaluated based upon total return on investment and marginal return on investment. Because it is impossible to know what the actual return on investment will be several years in the future, other parameters need to be found to guide our investment strategy. While this problem may seem disturbing at first, it is really no different than the one faced when choosing a portfolio of securities. I recommend the following be used to guide our investment strategy:

1. present value of the fishery;
2. clues of latent production potential;
3. cost to develop intensive management;
4. fraction of fishery value needed for investment;
5. historic track record of similar investments;
6. availability of existing technology to provide needed data or;
7. likihood of research to provide needed technology and;
8. subsequent ability to develop in-season management programs.

Our selection process should begin by summarizing the existing value of the stock(s). We need to temper a synopsis based only on readily available ex-vessel value because such statistics can be misleading if the fishery is developing or if substantial latent production potential exists. Ex-vessel value may also be misleading when judging the relative importance of a particular resource to a region's total economy since some fisheries may contribute more to local economics than others. This can occur because of such things as differences in value-added processing, labor costs in harvesting, or residency.

The cost to develop intensive management should be broken down into two categories. The first category is development of an investment-return relationships. Cost in this category should include what it takes to reconstruct the entire run or reconstruct indicator stocks, depending upon the particular situation. The second category is development of quantitative in-season management systems that assure the correct split between extraction of current-year income and investment for future years' income. In many cases, run reconstruction programs needed to determine investment-return relationships can also be designed to provide data needed for in-season management; these cost saving opportunities need to be given a high priority.

Once value and costs are estimated, we should compute the fraction of the ex-vessel value we intend to spend and compare it to costs incurred elsewhere to intensively manage. The comparison should consider similarities in life history, size of resource, structure of fisheries, logistic difficulties and technical complexity. This procedure is more than a reality check; it permits us, in a simple yet elegant way, to compare our current and proposed investments in management against programs with a long history of development and known returns on investment.

What fraction of a fishery's value should we expect to incur to intensively manage our fisheries? The best known intensively managed fishery resource in Alaska is probably the sockeye stocks of Bristol Bay. For this large, high-valued stock which is harvested mostly in terminal fisheries, Alaskans invest about 2% per year of the ex-vessel value in management. In Southeast, we have been investing about 4% of value for managing Situk, Chilkoot, and Chilkat sockeye. However, because our programs are not as complete as those of Bristol Bay, these percents are somewhat low. These examples indicate best-case examples of what we can expect to pay because most stocks are smaller, less valuable and are caught over a wide area. When I reviewed costs incurred to intensively manage other fisheries in Alaska the percent of value typically ran from 5% to 12%. Because most of the management problems we face in Southeast are complex, I expect our costs to trend towards the high end of this spectrum.

I have also tried to determine what other jurisdictions spend to manage their fisheries. I found it very difficult to obtain detailed information, but if one simply compares overall management costs and value of commercial fisheries, Alaskans spend only about on-tenth as much per unit of value as does Oregon, Washington or California.

How does an estimate of 5 to 10 percent of annual earnings as a management cost compare to other investments? Investment bankers base their management fee structure on the nature of the security and amount invested. Perhaps the best, though very simplistic analogy, is the management fee for an aggressive capital-growth-minded mutual fund. The Alliance Quasar Fund has such an investment philosophy. The cost to manage that fund is about 1.3 % of total net assets of the fund each year. The aggressive investments of this fund are earning about 15 percent per year. Thus, the shareholders are paying about 9% of their annual earnings each year for management!

Earnings, Costs and Opportunities

Very few of Southeast's fish stocks are intensively managed, but virtually all could be. Over the years, a large number of these intensive management opportunities have been identified, I sorted through and categorized these opportunities by type of activity. Next, I superimposed current state expenditures, from all sources, to better understand what the scope of our opportunities was and what they would cost. Last, I compared the program costs with the current value of the fisheries. What emerged was a spending pattern that generally met the public's expectation for participation in regulatory meetings, compilation of fishery statistics and access to a biologist to answer questions; however, what also emerged was alarming lack of investment to obtain the information on which to base regulatory decisions. Overall, we invest only about half what is needed! I begin this part of my presentation with an overview of the value of the region's fisheries and current expenditures.

The average annual commercial earnings, expressed as ex-vessel value, for our Southeast Fishery Permanent Fund (Table 1) is about $153 million. Almost three-fourths of this value is attributable to our salmon resources. Substantial earnings are also realized from halibut ($12 million), herring ($9 million), Dungeness crab ($5 million), sablefish ($4 million), king crab ($3.6 million), Tanner crab ($2 million), shrimp ($1.6 million) and rockfish ($1.0 million). Developing fisheries, such as those for sea cucumbers, urchins and clams, seem to have a large earning potential also.

Besides commercial ex-vessel values, earnings from the Southeast Fishery Permanent Fund are also associated with harvests by recreational, personal use and subsistence fishermen. Precise regional values attributable to recreational harvests by residents and tourists will not be available for several months, however, preliminary information suggests the recreational value, expressed as angler expenditures, is about $40 million. Most of this value is associated with halibut, chinook and coho salmon. Thus, I estimate the total annual earnings, exclusive of economic multipliers, for the Southeast Fishery Permanent Fund to be about $200 million.

Three types of revenue are used to manage the Southeast Fishery Permanent Fund: state general funds, test fishing program receipts and federal funds. While state general funds can be used for any type of activity, test fish funds and federal funds can not. For FY 90 the funding base is $3.7 million from the general fund, $0.6 million from matching federal aid, $0.5 million from test fishing and $2.4 million for stocks of concern to the Pacific Salmon Commission. One impact of the restricted nature of the federal funds has been development of sophisticated, intense management systems for some stocks, like transboundary river sockeye, and essentially no data for other stocks, like brown king crab.

Next, I briefly review investment opportunities, current management cost and license fees for each portfolio in our Fishery Permanent Fund.

The combined commercial and recreational value of our salmon portfolio is about $137 million. In the commercial fisheries about half the annual earnings accrue to purse seine fishermen. Power troll and drift gill net fishermen each account for about 20% of earnings while the set gill net and hand troll fishermen split the remaining 10%. Residents receive about 60% of earnings. State license fees cost from $50 for resident set gill net fishermen and troll fishermen to $450 for non-resident gill net fishermen. These fees represent from .07% of annual average earnings per vessel for resident seine fishermen to 3% of annual average earnings for non-resident hand troll fishermen.

The current investment to manage our region's salmon portfolio is about $5.3 million (Table 2) or 3.9% of value; less than half this amount is from state general funds. Intensive management will cost about twice the current investment or 8% of annual earnings. Overall, this cost is relatively higher than for the management of stocks like Lynn Canal and Situk sockeye because most of the production and harvest in Southeast is distributed among many which originate over our vast geographic area rather than being locally concentrated. This distribution of catches and escapements adds technical complexity and makes logistics more expensive.

Most (76%) of the funding shortfall in the current management program is to obtain the run reconstruction data that are needed to determine the investment-return relationships for the various stocks. Among the various activities which the department performs, we need to invest most in those that provide reliable estimates of the number of fish escaping and in determining their harvest rates. Once these data are obtained, efforts will also have to be directed towards addressing in-season estimates of run strength and to assisting the Board of Fisheries in developing regulations to harvest the surplus production. In terms of total funds and percent, the pink salmon program is in need of the most investment; but wise investment opportunities also exist for the other species.

Current annual earnings from our invertebrate stocks portfolio is about $13 million. However, major declines have occurred in the pattern of our earnings including: collapse of the red and blue king crab fishery, earnings in the Tanner crab fishery are only one-fourth of their historic high, Dungeness crab are earning only one-third their historic high and shrimp are earning about one-half their historic high. On the up side, interest has recently exploded around development of a sea cucumber fishery.

Many crab fishermen participate in more than one fishery. While it takes a fairly large boat to participate in the king and Tanner crab fisheries, many small boats participate in the Dungeness fishery. License fees generally run from $50 for residents to $150 for non-residents; fees are much higher for the shrimp otter trawl fishery. License fees cost from about .1% of annual ex-vessel earnings for resident brown king crab and Dungeness fishermen to 1.8% for non-resident shrimp fishermen.

The current annual cost to manage our shellfish portfolio (Table 3) is about $435.0 or 3% of annual earnings. Intensive management will cost almost four times this amount. While investing 12% of current earnings is high, historic earnings patterns indicate that when the stocks are rebuilt and managed for maximum sustained yield, this percent will drop dramatically. Like our other portfolios, current spending patterns emphasize in-season management and public service with little to no effort to obtain quantitative data on which to base management decisions.

The annual earnings from our groundfish and herring portfolio is about $27.6 million. The most valuable resources are halibut ($12.4 million), herring ($9.4 million), sablefish ($4.1 million) and rockfish ($1.1 million). The herring fishery is subject to limited entry, the others are not. For the fisheries where data are available (see Table 1) license fees range from 0.2% of annual value for resident purse seine herring and sablefish fishermen to 3% for non-resident flatfish fishermen.

About two-thirds of the annual earnings from the herring portfolio accrue to purse seine fishermen. The current rate of investment of 7% to manage this resource (Table 4) is very close to that needed. Unlike most fisheries in Southeast, a significant fraction of expenditures are directed towards obtaining the data needed to determine the investment-return relationships for the many stocks.

Like the chinook salmon fishery, harvest quotas for our halibut fishery are set by an international commission. Unlike the chinook fishery, we contribute very little to assessing the productivity of these stocks or in designing regulations to meet local needs. The modest funding gap for halibut reflects only these needs.

We currently spend 4% of value to manage our sablefish portfolio; test fish receipts pay about half the bill. We need to approximately double this investment and spend most of it to determining the investment-return relationship.

Management of the rockfish, flatfish, pacific cod and lingcod resources present a difficult investment problem. We can not obtain quality investment-return data to manage these species without spending from 60% to 120% of annual earning. We have only three basic choices: close the fisheries, adopt what we think are conservative management programs or subsidize the management program. If we do not make one of these conscious choices, public pressure for minimal regulation can, like it has in many other fisheries, cause resource depletion.

When you add all these figures up, we are currently investing only about one-half what is needed to intensively manage our Southeast Fishery Permanent Fund. So, what should we do? I suggest a "public stock offering".

A PUBLIC STOCK OFFERING

Adequate funding to intensively manage Southeast's Fishery Permanent Fund can only be secured through legislative action. Legislative action is possible only if Alaskans understand the economics of the issue. I would now like to describe a personal perspective on why Alaska has not developed an intensive management or funding policy, offer a personal view on what the policy should be and a view on what it will take to get from here, to there.

The fishery resources of Alaska are taken for granted by most. The vast wealth of our fisheries are viewed as inexhaustible and free; management is viewed as restriction of opportunity--not as an investment opportunity. Significant political attention seems to focus on our fisheries only when fishermen have faced eminent disasters. This has occurred three times in the last 20 years. In the early to mid 1970's declining catches of salmon statewide were a major impetus to development of enhancement programs and to increased funding for management. In the mid 1980's concern over the impact of the Pacific Salmon Treaty to Southeast fishermen had the same result. Finally, in 1989 vast sums of money were invested in fisheries research when the Exxon Valdez spilled oil in Prince William Sound. This is the sad, recent history of funding on fishery research and management in Alaska.

Only recently has the value of intensive management in Alaska been quantitatively estimated. To my knowledge, this and Dr. Eggers' summary of the benefits of intensively managing Bristol Bay sockeye are the only two documents on the topic. In neither case have these studies received widespread public review; this shortcoming is our fault, and my reason for addressing you today. Despite the documented benefits of funding fishery management, I doubt that the legislature will, through the administrative budgeting process, choose to increase funding for fisheries. I am also doubtful that requests from the industry, by themselves, will be sufficient to fund intensive management.

While the fishery resources of Alaska belong to all citizens, entry into most commercial fisheries is limited. This was not done to privatize ownership, rather it was done to secure the economic viability of the fleets and the local communities which depend on fishing. However, the fishermen are the perceived beneficiaries of intensive management; thus, they need to be the advocates for intensive management. Because history suggests that advocacy probably won't succeed by itself, a partnership needs to emerge. The partnership needs to be based on a commitment among Alaskans to jointly invest and jointly share profits.

Four sources of investment capital are available: increased general fund revenues, increased license fees, expanded test fishery revenue (where appropriate) and increase federal funds. While not presuming any specific formula, it is clear to me that, like any business venture, a basic principal applies: never invest in a partnership unless your partner does too. Thus, I believe that the industry must be willing to support substantial increases in license fees and test fishing before the legislature or federal government would be willing to support increased appropriations. To guide the investments and choose among alternatives, I propose formation of a joint industry-state fishery investment council.

I hope my presentation has helped show you what is possible, what is needed and how we might get from here to there. In the next few years, each of you will be seriously evaluating options for how we might succeed in diversifying the Southeast Region's economy to alleviate the inevitable impacts of declining oil revenues. I hope you carefully weigh the option of investing in a proven investment--our Southeast Fishery Permanent Fund. Thank you.

SUGGESTIONS FOR FURTHER READING

Eggers, Douglas M. 1988. The costs and benefits of the Alaska Department of Fish and Game's natural stock management program; the case for Bristol Bay sockeye salmon. ADF&G Regional Information Report No. 5J88-04. 21p.

Kruse, Gordon H. 1988. An overview of Alaska's fisheries: Catch and economic importance of the resources, participants in the fisheries, revenues generated, and expenditures on management. ADF&G Fisheries Research Bulletin, 88-01. 71p.

Table 1. Summary of permits, value, and license fees for fisheries in State managed waters of Southeast Alaska. Data are presented as recent annual averages and value is adjusted to 1989 using the consumer price index.

Fishery	Years	Residency	Permits Fished	Percent	Total Annual Gross Earnings (X 1000)	Gross Earnings Per Vessel (X 1000)	License Fees	
							Resident	Non-Resident
Salmon								
Purse Seine	1985-1989	Resident	167	45	$ 25,606			
	1985-1989	Non-Resident	209	56	31,721			
	1985-1989	Total	376		57,327	$ 153	$ 100	$ 300
Drift Gill Net	1985-1989	Resident	318	69	15,665			
	1985-1989	Non-Resident	144	31	7,159			
	1985-1989	Total	462		22,824	49	150	450
Set Net	1985-1989	Resident	133	86	4,054			
	1985-1989	Non-Resident	22	14	735			
	1985-1989	Total	155		4,789	31	50	150
Power Troll	1985-1989	Resident	654	79	18,383			
	1985-1989	Non-Resident	176	21	4,980			
	1985-1989	Total	830		23,363	28	50	150
Hand Troll	1985-1989	Resident	720	92	3,825			
	1985-1989	Non-Resident	63	8	335			
	1985-1989	Total	783		4,160	5	50	150
				Subtotal	$112,463			
Herring								
Purse Seine	1984-1988	Resident	45	88	5,534			
	1984-1988	Non-Resident	6	12	767			
	1984-1988	Total	51		6,301	124	250	750
Gill Net	1984-1988	Resident	85	70	2,188			
	1984-1988	Non-Resident	36	30	955			
	1984-1988	Total	121		3,143	26	150	450
				Subtotal	$ 9,445			
Groundfish								
Halibut[a]								
Inside	1984-1988				7,416			
Outside	1984-1988				5,001			
	1984-1988	Total	1,347	DNA	12,417	9	50	150
Sablefish[b]	1985-1988	Total	176	DNA	4,177	24	50	150
Rockfish[c]	1985-1988	Total	DNA	DNA	1,098	DNA	50	150
Flatfish[d]	1985-1988	Total	8	DNA	166	23	250	750
Pacific Cod[d]	1985-1988	Total	DNA	DNA	139	DNA	50	150
Ling Cod[d]	1985-1988	Total	DNA	DNA	140	DNA	50	150
				Subtotal	$ 18,136			
Crab								
Brown King	1983-1987	Total	64[e]	DNA	3,028	48[e]		
Red and Blue King	1983-1987	Total	50	DNA	533	5[e]		
Dungeness	1983-1987	Total	199	DNA	3,167	16	50	150
Yakutat Dungeness	1983-1987	Total	38	DNA	1,838	51	50	150
Tanner	1983-1987	Total	86	DNA	2,175	25[e]		
Yakutat Tanner	1983-1985	Total	4	DNA	8	2	50	150
				Subtotal	$ 10,750			
Shrimp								
Pots	1983-1987	Total	100	DNA	1,022	10	50	150
Otter Trawl	1983-1987	Total	5	DNA	91	33[f]	200	600
Beam Trawl	1983-1987	Total	20	DNA	496	25	50	150
				Subtotal	$ 1,609			
Miscellaneous Invertebrates[g]	1987-1989	Total	N/A	DNA	733	N/A	50	150
Total					$153,137			

DNA = Data not available N/A = Not applicable

[a] Includes catches in International Pacific Halibut Commission Area 2-C only (inside and outside waters of Southeast Alaska east of the longitude of Cape Spencer). Landings to ports in Southeast Alaska average 18% higher because of additional halibut landings from the Gulf of Alaska.
[b] Includes sablefish landings from State managed waters only. Landings from the Gulf of Alaska in Federally managed waters are not included.
[c] Includes landings from the directed fisheries and incidental fisheries in State managed waters.
[d] Average number of boats for crab and shrimp fisheries. Average number of permits fished may be less.
[e] License costs for Southeast Alaska king and Tanner crab limited entry fisheries are as follows:

	Resident	Non-resident		Resident	Non-resident
Red and blue king crab	$ 50	$ 150	Red, blue, and brown king crab	$ 150	$ 450
Brown king crab only	50	150	Red and blue king and Tanner crab	50	150
Brown king and Tanner crab	50	150	Red, blue, brown king and Tanner crab	250	750
Tanner crab only	50	150			

[f] Average includes years 1983, 1984 and 1986 only.
[g] Includes catches of sea cucumbers, geoduck clams, scallops, abalone, octopus, sea snails, and sea urchins in State managed waters.

Table 2. Current versus estimated level of funding (in thousands of dollars) needed to implement intensive management for the salmon portfolio of Southeast Alaska. Funding sources are G.F., State general funds; T.F., test fishing program receipts; F.A., Federal Anadromous Fish Act matching (50:50) funds; P.S.C., federal cooperative agreement funds to implement management for stocks of concern to the Pacific Salmon Commission; D.J., federal excise tax receipts to manage stocks of concern to recreational fishermen. Non-Alaskan stocks of international concern are not included in totals.

	Run Reconstruction Data Needed to Determine the Investment - Return Relationship			In-Season Management	Public Services		
Species	Escapement	Stock Composition or Harvest Rate	Age/ Sex	Fish Power Analysis Abund. Forecast Catch Estimation	P.S.C. Board of Fish, Permitting, etc.	Total	Percent of Required Funding
Pink							
G.F., F.A. & T.F	166.0	27.0	47.0	390.0	85.0	715.0	
P.S.C. Support				110.0	70.0	180.0	
D.J. Support							
Gap	630.0	1,050.0	75.0	300.0	50.0	2,105.0	30%
Coho							
G.F., F.A. & T.F.	90.0	90.0	40.0	410.0	110.0	740.0	
P.S.C. Support	85.0	50.0		160.0	80.0	375.0	
D.J.Support	70.0	70.0	10.0	100.0	50.0	300.0	
Gap	195.0	570.0	25.0	155.0	50.0	995.0	59%
Sockeye							
G.F. & T.F.	225.0	50.0	50.0	140.0	70.0	535.0	
P.S.C. Support	95.0	145.0	50.0	115.0	115.0	520.0	
Gap	550.0	275.0	25.0	90.0	50.0	990.0	52%
Chum							
G.F. F.A. & T.F.	65.0	10.0	40.0	90.0	20.0	225.0	
P.S.C. Support	25.0	130.0		60.0	25.0	240.0	
Gap	250.0	325.0	20.0	55.0	20.0	670.0	41%
Chinook							
G.F., F.A. & T.F.	10.0	20.0	40.0	160.0	25.0	255.0	
P.S.C. Support	50.0	25.0	25.0	215.0	90.0	405.0	
D.J. Support	60.0	50.0	10.0	100.0	50.0	270.0	
Gap	125.0	125.0	30.0	40.0	20.0	340.0	73%
Hatchery Stocks							
G.F., F.A & T.F.		150.0	25.0	175.0	35.0	385.0	
Gap		185.0		90.0	85.0	360.0	46%
Land Use							
G.F.						235.0	
Gap						260.0	48%
Pacific Salmon Commission International Stocks		[530.0]			[145.0]	[675.0]	
TOTAL							
Current Funding	941.0	817.0	337.0	2,225.0	825.0	5,380.0	
Program Gap	1,750.0	2530.0	175.0	730.0	275.0	5,720.0	
Percent of Required Funding	35%	24%	66%	75%	75%	48%	

Table 3. Current versus estimated level of funding (in thousands of dollars) needed to implement intensive management for the shellfish portfolio of Southeast Alaska. Test fish receipts of about $40.0 fund a red king crab cruise and general funds support the remainder of the program.

Species	Data Needed to Determine the Investment - Return Relationship: Distribution & Abundance	Age & Growth	Natural Mortality & Recruitment	In-Season Management: Fishery Monit. Regulation & Catch Estimation	Public Services: Board of Fish & Industry Coord.	Total	Percent of Required Funding
Brown King Crab							
Current Program				63.0	14.0	77.0	
Gap	18.0	71.0	79.0	24.0	18.0	210.0	27%
Red & Blue King Crab							
Current Program	75.0	15.0	9.0	13.0	8.0	120.0	
Gap	63.0	59.0	47.0	47.0	3.0	219.0	36%
Dungeness Crab							
Current Program				46.0	16.0	62.0	
Gap	52.0	15.0	42.0	42.0	37.0	188.0	25%
Tanner Crab							
Current Program				51.0	11.0	62.0	
Gap	45.0	15.0	37.0	30.0	15.0	142.0	31%
Shrimp							
Current Program	15.0			8.0	8.0	31.0	
Gap	81.0	53.0	62.0	62.0	3.0	261.0	11%
Cucumbers, Clams & Urchins							
Current Program	41.0	3.0	3.0	28.0	8.0	83.0	
Gap	44.0	26.0	8.0	34.0	29.0	141.0	37%
Total							
Current Program	131.0	18.0	12.0	209.0	65.0	435.0	
Gap	303.0	239.0	275.0	239.0	105.0	1,161.0	27%
Percent	30%	7%	4%	47%	38%	27%	

Table 4. Current versus estimated level of funding (in thousands of dollars) needed to implement intensive management for the groundfish and herring portfolio of Southeast Alaska. Sources of funds used to manage this portfolio include $97.8 in test fish funds for groundfish, and federal matching funds of $140.0 and $90.2 to manage herring and groundfish resources, respectively.

	Data Needed to Determine the Investment - Return Relationship			In-Season Management	Public Services		
Species	Distribution & Abundance	Age & Growth	Natural Mortality & Recruitment	Fishery Monit. Regulation & Catch Estimation	Board of Fish & Industry Coord.	Total	Percent of Required Funding
Herring							
Current program	410.0	50.0	100.0	175.0	85.0	820.0	
Gap	100.0	50.0	100.0	30.0		280.0	75%
Halibut							
Current Program				13.0	4.0	17.0	
Gap	100.0	30.0		40.0	45.0	215.0	7%
Sablefish							
Current Program	83.0	22.0	9.0	35.0	31.0	180.0	
Gap	80.0	30.0	35.0	5.0	5.0	155.0	54%
Rockfish							
G.F., F.A.	48.0	18.0		35.0	35.0	136.0	
Gap	310.0	95.0	75.0	5.0	5.0	490.0	22%
Flatfish							
Current Program	13.0	4.0		9.0	4.0	30.0	
Gap	40.0	10.0	10.0	5.0	5.0	70.0	30%
Pacific Cod							
Current Program	4.0				4.0	8.0	
Gap	40.0	10.0	10.0	5.0	5.0	70.0	10%
Lincod							
Current Program	18.0	4.0	4.0	8.0	26.0	60.0	
Gap	45.0	30.0	15.0	5.0	5.0	100.0	38%
Total							
Current Program	576	98	113	275	189	1,251	
Gap	715	255	245	95	70	1,380	
Percent							

General Fishery Investment Relationship vs. Fixed 10% Certificate of Deposit

as shown for Chilkat Lake sockeye

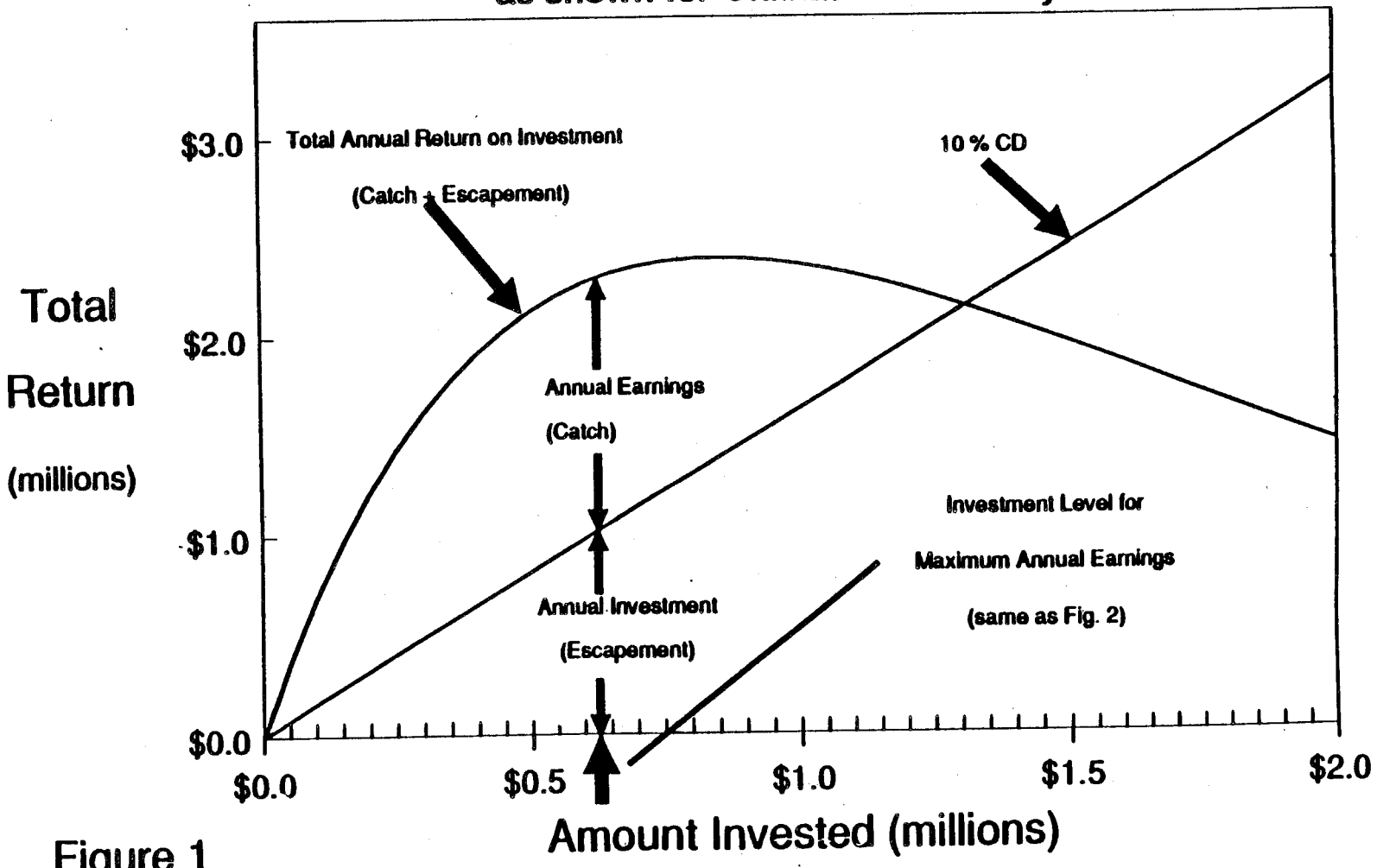

Figure 1

Annual % Return for Three Sockeye Salmon Stocks vs. 10% CD

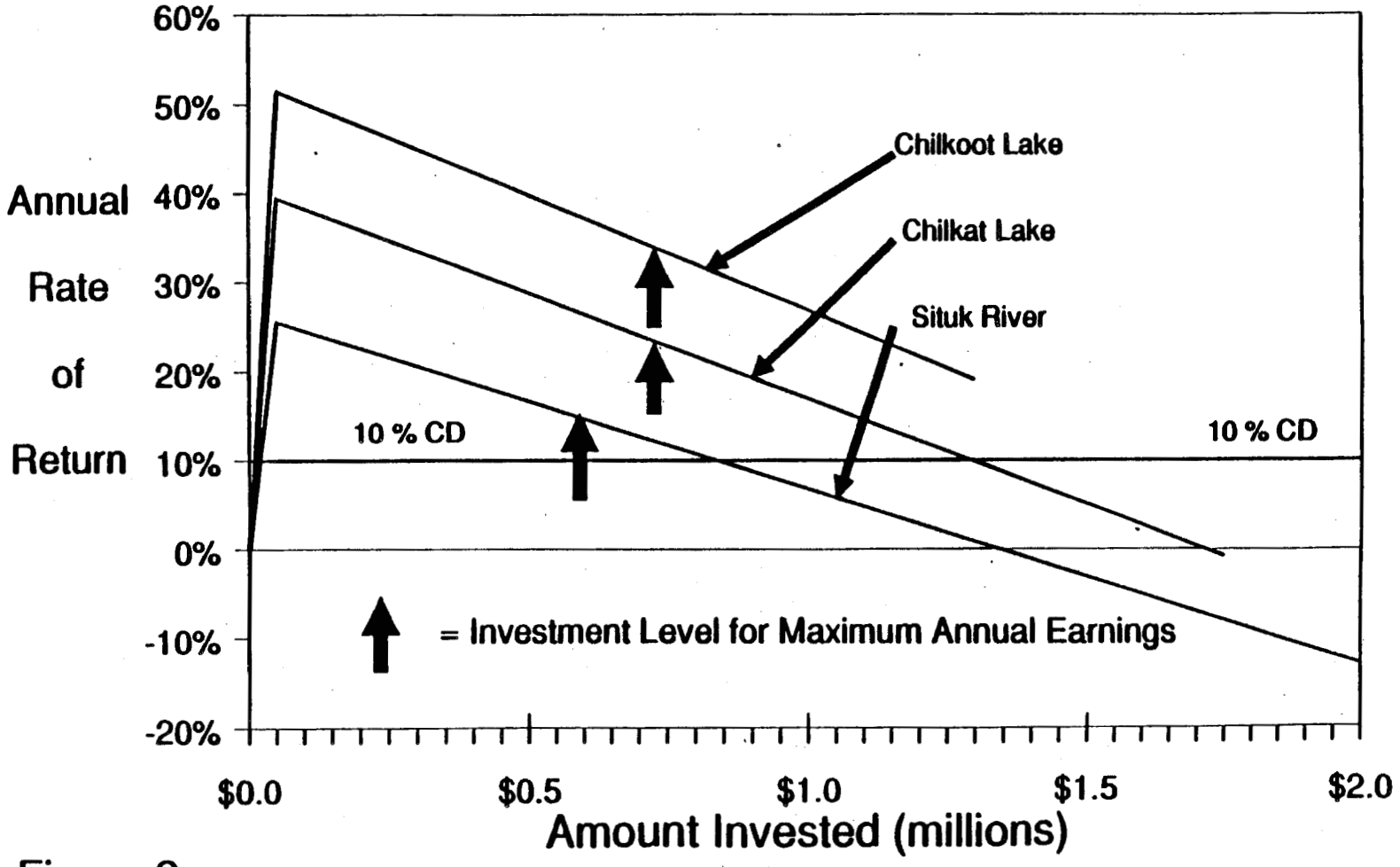

Figure 2

Annual Earnings of Three Sockeye Salmon Stocks vs. Fixed 10% CD

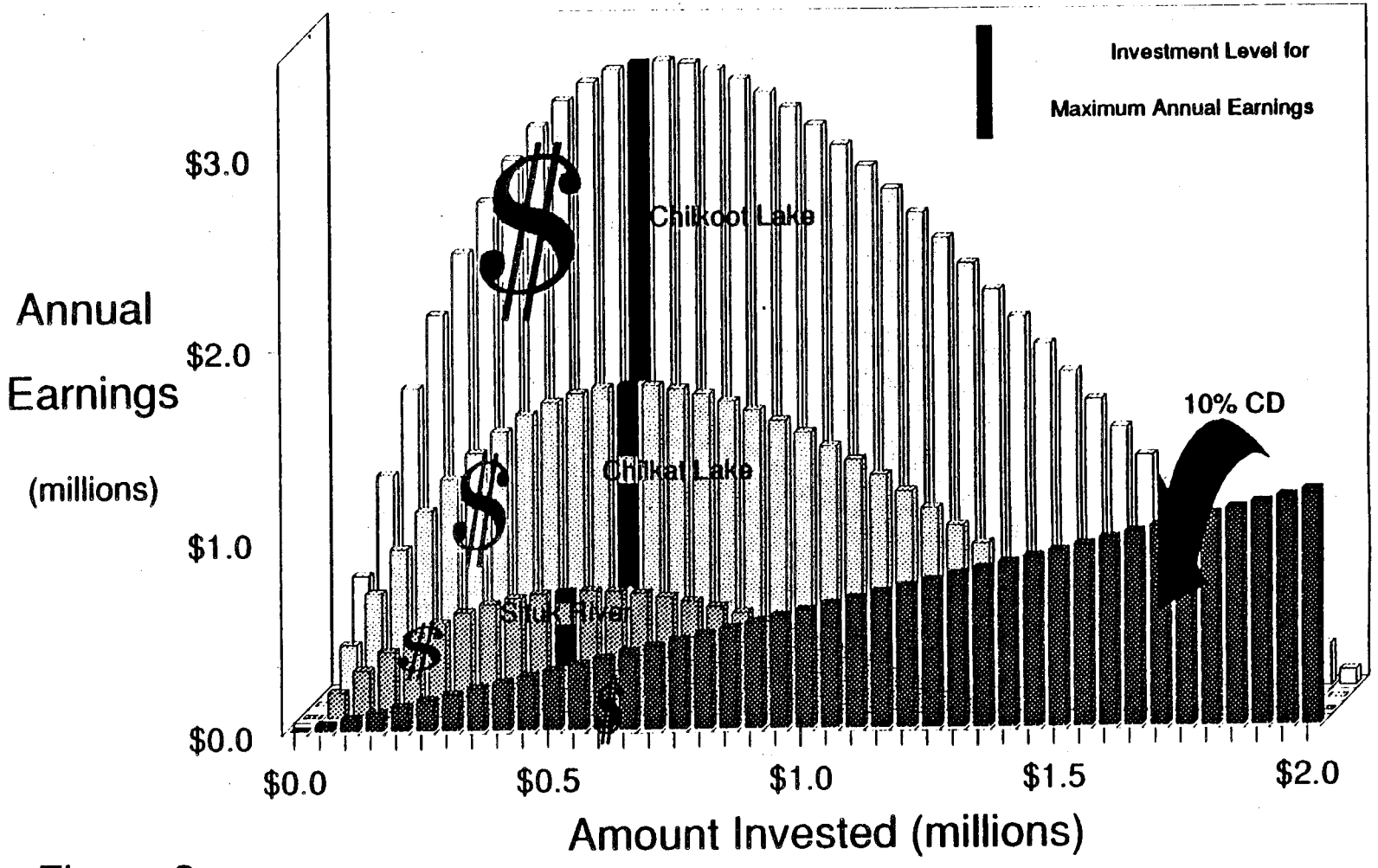

Figure 3

General Fishery Relationship showing Variable Returns due to Environment

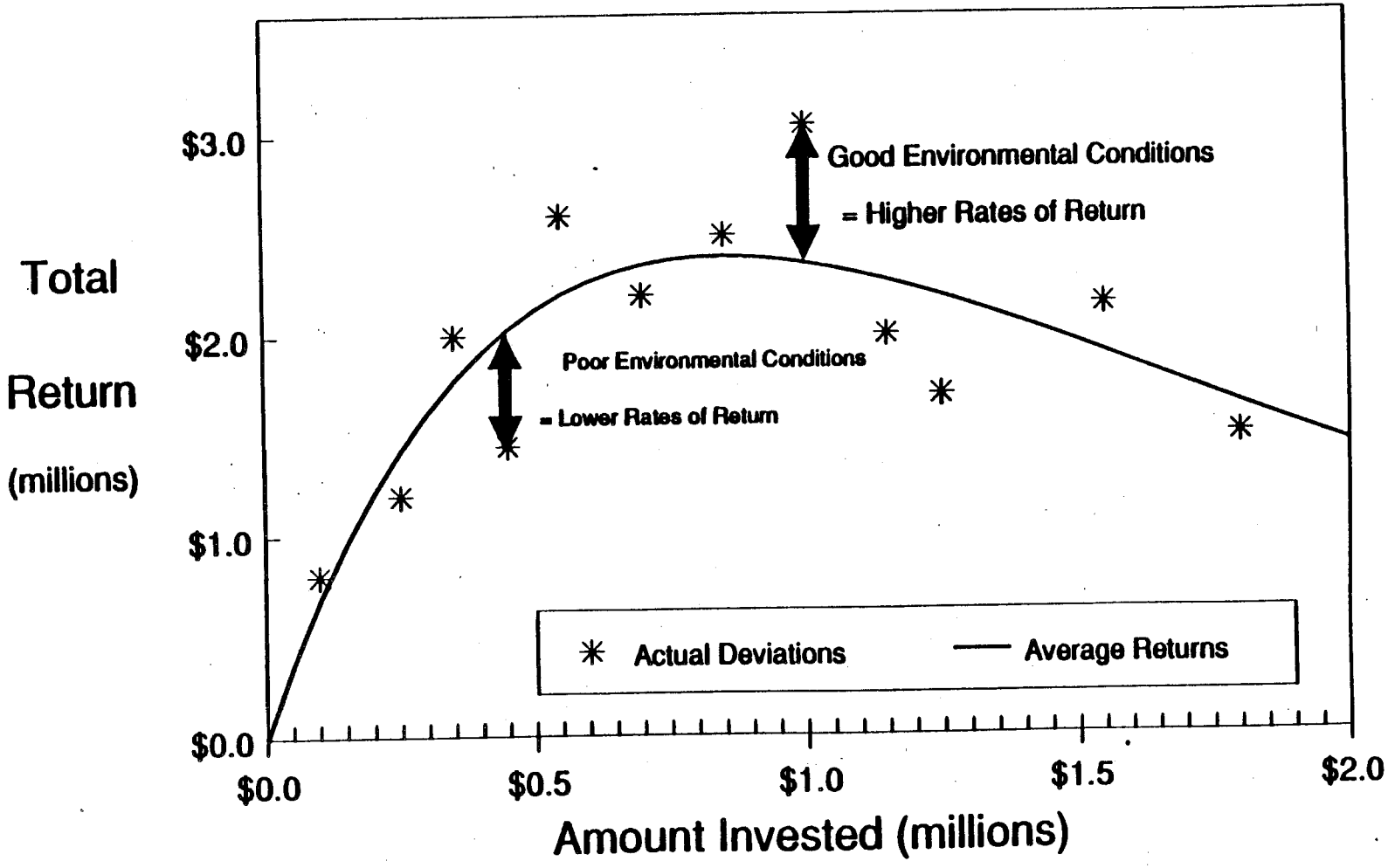

Figure 4

Consquences of Various Management Strategies

as Exemplified by Chilkat Lake sockeye

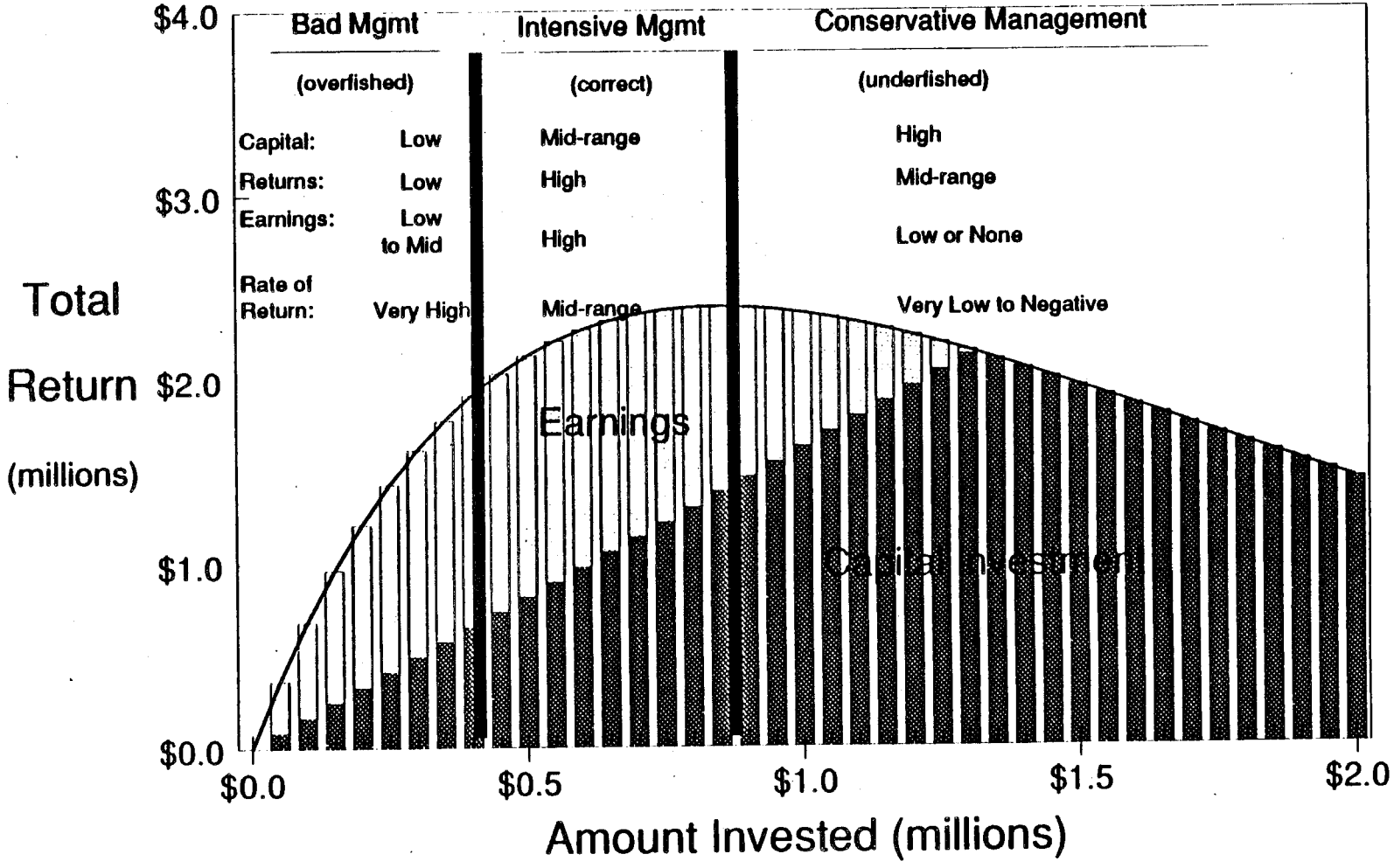

Figure 5